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ABSTRACT

This paper presents findings of a study that investigated factors that contribute to the engagement of students. Based on the theoretical model of Newmann, Wehlage, and Lamborn (1992), the study examined the effect of instructional approaches of teachers, contextual features of classrooms, and attributes of student experience on students' engagement in academic work. The sample, obtained through a nationwide selection process, included 24 public schools (8 elementary, 8 middle, and 8 high schools) deeply involved in restructuring. Data were collected from a survey of 5th-, 8th-, and 10th-grade students and their teachers from six core classrooms (3 mathematics and 3 social sciences) in each of the 24 schools. Over 3,660 students in 143 of the 149 core classrooms completed surveys. Two-way analysis of variance (ANOVA) and hierarchical linear modeling (HLM) were used to analyze the data. Findings confirmed the importance of authentic work and structures of support for students. Student self-concept had a moderate effect on engagement, and girls were more engaged than were boys. Students in mathematics classes had higher levels of engagement than those in social studies classes. Surprisingly, the use of traditional instructional methods exerted a positive influence on student engagement, while progressive methods did not. The data indicate that progressive methods must be combined with challenging content and a clear focus of inquiry. Specific restructuring content, such as authentic academic work and structures of support for learning, proved important in raising student engagement even where generalized restructuring was taking place. Two figures and six tables are included. Appendices contain statistical data and information on the construction of variables and methodology. (LMI)

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STUDENT ENGAGEMENT IN THE CLASSROOMS OF RESTRUCTURING SCHOOLS

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Student Engagement in the Classrooms of Restructuring Schools

In the mid-1980s a series of field studies (e.g., Cusick, 1983; Goodlad, 1984; Oakes, 1985; Powell, Farrar, and Cohen, 1986; Sizer, 1985; Sedlak, Wheeler, Pullin, & Cusick, 1986) presented a troubling picture of the internal organization of high schools as routinized bureaucracies where, for the most part, dispirited teachers and disengaged students "put in their time," while negotiating a sprawling and fragmented curriculum. Variously typified as ennui, malaise, alienation, anomie -- the student disengagement these researchers portrayed has come to be recognized as a deep and pervasive problem, particularly in U.S. high schools (Newmann, 1992). Chronic disengagement reportedly afflicts at least two-thirds of high school students (Sedlak et al., 1986), an estimate that excludes large proportions of repeated absentees and dropouts.[1] Lack of engagement with academic work during high school adversely affects student achievement and initiates a downward spiral that may lead to dysfunctional school behavior and, ultimately, culminate in some students leaving school entirely (Finn, 1989; Wehlage, Rutter, Smith, Lesko & Fernandez, 1989). Although no comparable estimate of disengagement exists for students in elementary schools, critics have indicted these schools for meaningless instructional activities that disillusion students about the usefulness of school, while failing to equip them with the skills they need to succeed in secondary school (Finn, 1993; Goodlad; Sedlak et al.).

If anomie is characteristic of U.S. education for the vast majority of students, under what conditions are they likely to become engaged? While classrooms where student engagement was high constituted a very small segment of the classrooms visited by the authors of the mid-1980s field studies, such classrooms did exist. When classroom involvement occurred, observers ascribed it to the high-track status of the class, students' self-selection into a program of special interest to them, or, occasionally, teachers' instructional styles, including the expectations they put forth for students

(Oakes, 1985; Powell et al., 1986). Despite the prevailing academic lassitude, the observers noted that within classrooms students sometimes varied in their degree of disengagement. While the majority of students seemed passive and bored, and some evidenced disdain reflecting a more profound alienation, in the same classroom settings, other students appeared somewhat interested or even involved -- variation Oakes (1985) attributed to an interplay of personal characteristics, school experience, and treatment in the classroom.

Approaching the problem of student disengagement theoretically, Newmann (1981, 1989) drew upon sociological and psychological literature on alienation to develop a conceptual model for engagement. Newmann located the sources of student disengagement in alienating characteristics of bureaucratically organized schools -- namely, meaningless, low-level school work and impersonal relationships with teachers and other students. For students to become academically engaged, therefore, would require a reversal of the alienating experiences: that is, a sense of membership in school to replace impersonality and isolation, and authentic academic work to replace low-level school work (Newmann, 1989; Newmann, Wehlage & Lamborn, 1992). Authentic academic work involves students intellectually in a process of disciplined inquiry to solve meaningful problems, that is, problems with relevance in the world beyond the classroom and of interest to them personally.

Because of their logical relationship to achievement, student engagement with schooling and with academic work emerged as valued student outcomes for school restructuring (Elmore, 1990; Murphy, 1991; Newmann, 1991a). Recent research on restructuring in middle schools and in high schools (based on data from NELS:88 and the first followup) has documented a positive relationship between school restructuring and student engagement (Lee & Smith, 1993, 1994). Because restructuring schools are moving away from bureaucratic organization to more organic organizational forms, the organizational shift may be contributing to student engagement and achievement gains (Lee & Smith).

Taking a close look at a nationally selected sample of elementary, middle, and high schools deeply immersed in restructuring (Berends & King, 1994), the present study investigates factors that contribute to the engagement of students in the social studies and mathematics classrooms of these schools. Since restructuring schools are likely to be making efforts to improve instruction and students' experience of school, the investigation examines instructional approaches of teachers, contextual features of classrooms, and attributes of student experience that may differentially influence students' engagement in academic work. Guiding the investigation is a modified version of the model for student engagement articulated by Newmann (1989) and Newmann, Wehlage & Lamborn (1992).

Background

Institutional Sources of Student Disengagement

Many students lack extrinsic motivation for serious engagement with schooling. Despite their academic disengagement throughout the school years, U.S. public education ritually promotes students from grade to grade and, ultimately, awards a diploma to those who persevere through high school. Representing attendance rather than achievement, such symbolic recognition reveals little about what students know or can do. Because the diploma has become devalued, high school has lost meaning educationally (Sedlak et al., 1986; Sizer, 1985). Employers rarely ask high schools to provide transcripts or to recommend students for possible employment (Bishop, 1989). Unless students are aspiring to highly selective colleges or universities with rigorous admissions criteria, incentives for students to achieve in high school are weak (Cohen, 1990).

Instruction. The failure of U.S. public education to engage students may also be a consequence of institutional inattention to the primary function of schools, instruction. An attenuated focus on the central mission is characteristic of bureaucratic organizations (Meyer and Rowan, 1978;

Zucker, 1987). Instruction is weakly normed compared to the institutional culture for bureaucracy, which attempts to ensure efficiency, order, and predictability in school operation. While schools attend carefully to "certifying" and "classifying" (ritual institutional and bureaucratic functions), these processes are disembedded from instruction and its expected concomitants -- student achievement and engagement. Despite being the central activity of schools and integral to their social function, instruction is generally *assumed* to be adequate, but is only loosely coordinated and rarely inspected (Meyer & Rowan).

Through their portrayal of intellectual vapidity in classrooms across the nation, the field studies of the 1980s exposed weaknesses and deficiencies in the "technical core" of schools (e.g., instruction, teaching and learning), which is normally shrouded in a "logic of confidence" (Meyer & Rowan, 1978). In most of the classrooms visited by the field researchers, instruction, typically following the transmission model, induced passivity among students. According to the transmission model, the teacher imparts information largely through lecture and the students take notes, recite, and fill out worksheets. Emphasizing low-level intellectual skills of repetition and recall, the transmission model breeds boredom and intellectual isolation (Coleman, 1961; Newmann, 1989). As typically enacted, therefore, school work is alienating (Carnoy and Levin, 1985). Alienating work, characterized by Marx (1982), is external to the worker's nature; forced rather than voluntary; and instrumental, rather than intrinsically motivated. Authentic work, in contrast, "entails extrinsic rewards, meets intrinsic interests, offers students a sense of ownership, is connected to the 'real world' (i.e., the world beyond school)" (Newmann, Wehlage & Lamborn, 1992, p. 23).

The bargain. Despite finding schoolwork typically irrelevant and unrewarding, students submit themselves to it, enroute to the diploma, under terms they find suitable. In all but the highest curricular tracks, students and teachers cut a mutually accommodating bargain (Powell, et al., 1986; Sedlak et al, 1986; Sizer, 1985). According to terms of the bargain, if teachers let students off with

only modest demands on their time and effort during the school day, most students cooperate and comply with the rules for classroom conduct. Ironically, for both teachers and students, such an arrangement is unfulfilling. When teachers find little challenge in the classroom, they put their energies into other interests -- for example, taking on a second job. Unchallenged U.S. students learn less and achieve at lower levels than their counterparts worldwide (Conley, 1993). Most disturbing, the flaccidity of U.S. students' intellectual experience in school thwarts their personal development (Czikszentmihalyi & Larson, 1984) and, ultimately, impoverishes society. If student engagement with academic work is to increase, schools and teachers will have to press for engagement with learning, especially for less academically proficient students (Sizer, 1985; Powell, Farrar, and Cohen; 1986).

School restructuring and student engagement. Because the school restructuring movement aims at remedying many of the problems besetting U.S. education, the organizational and programmatic innovations of restructuring schools may enhance student engagement. Some restructuring schools have begun to move away from bureaucratic organization and toward organizational forms that are more communitarian and personal, such as multi-year advisory groups and the school-within-a-school (Conley, 1993). Instruction as the transmission of information is, in some restructuring schools, giving way to an emphasis on the active involvement of students in constructing knowledge (Leinhardt, 1992; Newmann & Wehlage, 1993). Since the investment of parental interest and energy in their children's education bears out in academic performance (Muller, 1993; Stevenson & Stigler, 1992), many restructuring schools are making systematic efforts to involve parents with student learning as well as in school activities and governance (Newmmann, 1991b). Because the expectations schools and teachers hold for all students' best performance directly influence how well students achieve, restructuring schools often strive to strengthen their commitment to equity. The resulting "success for all" instructional emphases may bring about greater student engagement.

Previous Research

Quantitative researchers have focused on student engagement in schools and classrooms as a valued outcome in its own right, as well as a predictor of achievement. Employing engagement as an outcome, the school-focused stream of the research has operationalized the construct globally and along two dimensions (e.g., Lee & Smith, 1993, 1994). The first dimension is positive and attitudinal, students' favorable disposition toward the academic work of school. The second dimension is negative and behavioral, students' evident alienation from school, characterized by at-risk activity. The classroom-focused stream of the research on engagement has usually investigated student involvement with academic work, operationalizing the construct more specifically and for particular settings, for example, as observed on- or off-task behavior in mathematics and social studies classrooms (Stodolsky, 1988).

School restructuring. Since increased student engagement is an expected consequence of school restructuring, researchers in the school-oriented stream of engagement studies have investigated this relationship. As noted earlier, these researchers have produced evidence of a link. Focusing on restructuring in middle schools, Lee and Smith (1993) found higher levels of academic engagement among students in schools that had undertaken more extensive restructuring (e.g., heterogeneous grouping, flexible time scheduling, schools-within-schools, team teaching, stability in homeroom arrangements). At-risk behavior proved independent of the amount of school restructuring, however. Investigating the influence of school restructuring in high schools, Lee and Smith (1994) found the least engaged students in schools that had undertaken no restructuring. Students proved to be more engaged in high schools with a greater academic emphasis as measured by aggregated coursework of students in mathematics and science and less variability in academic course-taking.

Instruction. Researchers focusing on classrooms have examined whether engagement varies as a function of instruction, classroom activities, and the subject matter of the class. Although levels of engagement did not vary between the elementary school social studies and mathematics classes studied by Stodolsky (1988), students in both subject areas were the most engaged by cognitively involving instruction. While Nystrand and Gamoran (1991) found high levels of procedural engagement in 8th grade English classes, they found little substantive engagement. Substantive engagement tended to occur when teachers posed open-ended questions, incorporated student responses into further questions, and built discussion around the ideas the exchange generated. Discourse quality in 9th grade classes (Gamoran and Nystrand, 1992), however, evidenced no consistent relationship with student engagement.

Achievement. Students achieve at higher levels when they are engaged. Reviews of the literature on engagement have consistently documented positive relationships between student academic performance and student involvement/participation in the classroom -- whether elementary, middle, or high school (Finn, 1989; Finn & Cox, 1992).[2] Supporting previous research with evidence from national data, Finn (1993) found that engaged 8th grade students achieved at higher levels than their less engaged peers. Examining the literature achievement of 8th grade students, Nystrand and Gamoran (1991) found disengagement adversely affected achievement, while substantive engagement influenced achievement positively. Among 9th grade students in English classes, Gamoran and Nystrand (1992) again found that disengagement negatively affected achievement. While behavioral engagement (e.g., completing reading and writing assignments) had a positive relationship with achievement, students' reported engagement (e.g., trying hard in class, concentrating on the lesson) did not significantly influence achievement.

Theoretical Perspective

Expanding on earlier work (Newmann 1981), Newmann, Wehlage and Lamborn (1992) articulated a theory of student academic engagement that drew upon the sociological theory of Merton (1968) and the psychological theory of Connell (1989). Defining engagement as "students' psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote" (p. 12), the authors proposed three bases for student academic engagement: (1) the fundamental human need to develop and express competence, (2) school membership, and (3) authentic academic work. Because the need for competence is generally inherent, most students begin their school careers motivated to learn. For many students, however, their experience of school dulls that motivation or even suppresses it entirely. Students are more likely to direct their need to develop and express competence toward academic commitment if they develop a sense of membership in the school community (i.e., identify with its clearly expressed purpose, experience fairness, caring, success, support) and if the schoolwork they are asked to do is authentic (Newmann, Wehlage & Lamborn, 1992).

Finn (1989, 1993) has also proposed a model for student engagement. Broader than the definition offered by Newmann et al., engagement, according to Finn's conceptualization, is student involvement with school. Engagement may take an affective or behavioral form. Affectively, engagement implies a sense of belonging and an acceptance of the goals of schooling. Behaviorally, engagement is a continuum of developing participation (i.e., compliance with school and classroom procedures, taking initiative in the classroom, becoming involved in school activities and, ultimately, taking part in school governance).

Differing from the model Newmann et al. (1992) proposed (engagement as a function of the human need to develop and express competence, school membership, and authentic work), Finn

situates engagement within an ongoing cyclical process. Participation leads to academic success, which, in turn, influences identification with school (i.e., the affective dimension of engagement -- valuing, belonging). Identification increases the likelihood of future engagement. The depiction of engagement as a product of cumulative school experience is a strength of Finn's model. By portraying engagement as largely a function of the individual, however, the model largely omits influences from organizational environments, except for instruction.

Building primarily upon the model proposed by Newmann, Wehlage & Lamborn (1992), the model of student engagement proposed and evaluated here directly incorporates two of their bases: students' need for competence as a motive for engagement and the importance of authentic work as a means of enlisting students' intellectual involvement. School membership, the third base posited by Newmann, et al., is reconfigured in the present model. A related construct, structures of support for learning, incorporates membership in school as "experience of school as a learning community." This construct also includes two other salient structures of support for learning -- classroom support (including the teacher's high expectations for student performance and peers' cooperation in the learning process) and parental support (including parents' interest, discussion, and involvement with the child concerning school and schooling). Students' past experience of school (success or alienation), a component of school membership in the Newmann et al. model, is represented separately here and hypothesized to influence present engagement in the academic work in mathematics or social studies classrooms (cf. Finn, 1989, 1993).

Theoretical Model

The theoretical model guiding this study is displayed in Figure 1. Read from left to right, the model focuses on the attributes of students and classrooms hypothesized to explain variation in student engagement in academic work. Each of these student and classroom characteristics is hypothesized to

have a direct relationship with engagement. Listed in the first block are student experiences of an academic environment -- including authentic academic work and structures of support for learning (i.e., school, classroom, and family); students' basic orientation toward school (success vs alienation); and personal and academic background (i.e., gender, self-concept [a proxy for the need to develop competence], race-ethnicity, social class, and prior achievement). Listed in the second block are the characteristics of classrooms hypothesized to influence the average engagement level of students. Classroom contextual features include the average level of authentic work, average level of prior achievement, and subject area (mathematics vs social studies). Teachers' pedagogical approach, i.e., the choice of instructional methods, also has the potential to influence student engagement. The model categorizes pedagogy as progressive and traditional.

Insert Figure 1 about here

Variation in Student Engagement Within Classrooms

In a given classroom, why are some students more or less engaged than others? Even though students in the same classroom are (presumably) exposed to the same subject content, teacher, instruction, and classroom peer group influences, some of them will be attentive, actively involved with the subject matter, sometimes initiating questions, while others are passive, distracted, even disruptive. To explain within-classroom variation in engagement, this investigation hypothesizes the importance of four facets of student experience: orientation toward school; authentic academic work; structures of social support for learning; and personal background.

Orientation toward school. Schooling is a powerful societal institution incorporating most young Americans until young adulthood. Schools attempt to impart a basic education (i.e, socially meaningful knowledge), to socialize students into democratic citizenship, and to make available the skills and credentials needed for productive and rewarding social roles. Students who are goal- or

performance-oriented are likely to accept the purpose of schooling and to invest in its rituals and requirements. Usually, academic success rewards such application. Because their less purposeful peers find the activities of school alien to their interests and, therefore, meaningless, they are likely to resist academic involvement. Not only are they less academically successful than students who identify with the goals of schooling, they may break rules, skip school, and otherwise rebel. Because students enter classrooms more or less integrated with the goals of schooling, their predispositions to become academically engaged differ dramatically.

Authentic work. Despite the commonalities in the instructional experience of students in the same classroom, students may differ in the extent to which they view their school work as authentic. Students who volunteer or who are called on more often, for example, are more likely to experience meaningful intellectual interactions. Differences in students' personal and experiential backgrounds might also affect their perceptions of schoolwork as authentic. The model proposed here assumes that students' perceptions of authentic work reflect their experience of authentic instruction (Newmann & Wehlage, 1993).

Authentic instruction departs from the stereotype of traditional instruction -- the lecturing teacher who imparts knowledge and the passive student who absorbs the information and who must be prepared to restate it in recitations or tests and quizzes. Authentic instruction emphasizes cognitively active students who construct meaning and produce knowledge, an instructional process that attains higher order objectives through disciplined inquiry, and student work that has value and relevance beyond the classroom. When instruction is characterized by these standards, students are likely to be experiencing authentic academic work.

Structures of social support for learning. The extent of support for learning that students receive from the groups to which they belong influences engagement in the classroom (Brown, 1993; Cusick, 1991; Lamborn et al., 1992). Important structures of academic support available to students

include the school itself as a social environment that promotes learning; teachers and peers in the classroom who hold high expectations for each other academically and who are actively involved with each other in learning; and demonstrated parental interest in their children's academic work and school-related activities. To the extent that these support structures are developed and focused on learning, students' engagement in the classroom will be greater.[3]

Students' self-concept. Self-concept is a proxy for the need to develop and express competence. A social-psychological construct, self-concept is represented by several dimensions -- among them self-esteem, "based on a sense of competence, power, or efficacy" (Gecas, 1982, p. 5). As related to competence, self-esteem derives from the ability to perform effectively, as demonstrated in the past and expected in the future (Connell, 1990). The self-concept thus provides a motive for personal actualization or the desire to achieve competence (Gecas, 1982). Without a positive self-concept, furthermore, powerlessness and, ultimately, alienation result.

Students' social background. Theoretically, the link between social background and engagement derives from Merton's theory of alienation (1968). When cultural goals and the institutional means to attain them are incongruent for some groups -- for example, racial and ethnic minorities -- the disjuncture may result in their alienation. Students desirous of achieving a respected place in society, but who do not regard their schools as preparing them for that status may thus become alienated. Although school ought to function as an opportunity structure for young people, knowledge that the structure fails to provide *them* opportunity could result in disengagement among some students.

Generally consistent with Merton's theory, most previous research has documented engagement as varying according to the social and academic background of students. As socioeconomic status increased, for example, so too did the level of student engagement (Finn, 1991, 1992; Lee & Smith, 1993, 1994). Similarly, prior achievement and academic background positively

influenced academic engagement and negatively influenced at-risk behavior (Lee & Smith, 1993, 1994). At all grade levels -- elementary, middle, and high school -- student gender differentially affected engagement. The relationship between gender and engagement seems to depart from Merton's theory. Since the gender stratification in society favors males (Epstein, 1988), they would seem likely to find society's institutions, such as schools, in line with their goals. Boys would, accordingly, seem more likely to be engaged with school. Girls, however, have consistently proven more academically engaged than boys (Finn, 1991, 1992; Lee & Smith, 1993, 1994).

The relationship between minority status and student engagement documented by previous research is not clearcut. Minority elementary school students proved less involved academically in Finn's (1992) study. Minority middle school students were more inclined to at-risk behavior than their non-minority counterparts, but the groups did not differ on academic involvement (Lee & Smith, 1993). However, minority high school students (in an analysis controlling for engagement during 8th grade) proved more likely to be positively oriented toward academics than Asian and non-Hispanic white students (Lee & Smith, 1994).

Variation in Student Engagement among Classrooms

Why does engagement vary from classroom to classroom? Reasonably, between-classroom differences in academic application may be a function of the subject matter, the type and quality of instruction, and the energy students derive from the classroom intellectual context, that is, the achievement level of the class and the average level of authentic work.

Subject matter. Subject matter conditions the professional practice of teachers (Stodolsky and Grossman, 1992); that is, teachers' views of knowledge, their instructional approaches, and their goals for students. These dimension of practice clearly have implications for student engagement. As a "basic" subject, math differs from social studies (an "enrichment" subject), in that its content is

sequential and predictable (Stodolsky, 1988). Students consider themselves more teacher-dependent in mathematics, where the teacher is the "source" of knowledge, compared to social studies, where the teacher is the "elaborator" of knowledge (Stodolsky, Salk & Glaessner, 1991). Among students at all grade levels, social studies is one of the least liked subjects -- considered "easy" by high school students and "difficult" by elementary school students (Goodlad, 1984; Stodolsky et al.). Social studies' inherent link to life outside the classroom might generate more interest among students than mathematics does because of its relevance to their experience. The public evaluation students expect in their mathematics classes, however, might encourage them to greater academic application there than in social studies classes.

Instructional methods. Teachers who use methods typically described as progressive, according to common perception, are more likely to succeed in engaging students than those who use traditional methods (Goodlad, 1984). Progressive methods include such approaches as active learning, cooperative groups, hands-on experiences, and independent research. Because these methods are student-centered and oriented to involving students directly in the construction of their learning in ways directly counter to the transmission model, progressive teaching may succeed in engaging students. Because traditional methods are teacher-centered, usually involving some variant of lecture and discussion, they may result in student disengagement. Ultimately, however, the relative efficacy of progressive vs traditional methods in enhancing student engagement is an empirical question. Since instructional approaches do not assure authentic student work (Newmann, Wehlage & Secada, 1995), whether teachers use progressive or traditional methods may not affect student engagement directly.

Classroom context. While authentic work is a dimension of student academic experience in the within-classroom model, in aggregate, authentic work also functions as a normative characteristic differentiating classrooms. That is, classrooms in which the average level of authentic work is high

are, reasonably, especially engaging environments. Although the classrooms studied in this investigation are generally heterogeneously grouped, even due to random variation, the achievement level of some classes would be higher than others. While the higher levels of average achievement would not in itself suggest higher levels of student engagement, prior research has supplied evidence of such a link (e.g., Lee & Smith, 1993, 1994).

Method

Sample

A major focus of the OERI Center for the Organization and Restructuring of Schools is the experience of students, including the relationship of instruction and school organizational features to student engagement in academic work. The sample of restructuring schools studied by the center consists of 24 public schools (8 elementary, 8 middle, and 8 high schools) selected through a national search (Berends & King, 1994). Important criteria for a school's inclusion in the study were indications of being well along in the process of restructuring both student experiences and the professional life of teachers (Newmann, 1991b).[4] The focal population for this study is a portion of the school restructuring sample, students (and their teachers) in grades 5, 8, and 10, from six core classrooms (3 mathematics and 3 social studies) in each of 24 restructuring schools.[5] Participating schools selected the core classrooms in each subject area according to two criteria specified by the Center: "At least one core teacher in each subject area is involved in the school's effort to restructure student experiences and ... the three classes reflect the range of student achievement within the grade as a whole" (Center for the Organization and Restructuring of Schools, 1992).

Data

The data for this investigation, collected during 1991-1994, are primarily the survey responses of social studies and mathematics teachers and their students in the targeted core classrooms. In

addition to many other questionnaire items, teachers -- with their target class in mind -- responded to questions about their instructional goals and practice, the extent of their control over the curriculum and classroom, and their personal and professional backgrounds. Students responded to survey items about their attitudes, behaviors, and experiences in either a target mathematics or social studies class; about their experience in school more generally; and about their personal and family background.[6]

The survey response rates were quite good, and the representation of students by grade level and subject area is fairly well-balanced. More than 3,660 students in 143 of the 149 core classrooms completed surveys, averaging 26 students per class.[7] Classes with survey data from both teachers and students numbered 138. The item response rates for completed teacher surveys was 95 percent and for completed student surveys, 96 percent. Table 1 displays the analytic sample for this investigation. Mathematics and social studies classrooms are equally represented at all grade levels. Except for the elementary school level where the number of students in social studies is less than in mathematics, social studies classes, on average, enroll more students (1904 vs 1765). Overall, the elementary students outnumber their counterparts in middle and high school by about 175 students at each level.

Insert Table 1 about here

Restructuring Schools and the Universe of U.S. Public Schools

Compared with the universe of U.S. public schools on a set of such typical statistics as size, social class, and minority enrollment, the restructuring schools in the sample are larger -- averaging 777 students vs a national average of 522. The schools in the restructuring sample enroll more Black and Hispanic students -- (20.6 percent Black students vs 16.3 percent nationally) and (21.7 percent Hispanic students vs 11.8 percent nationally). A substantial portion of the sample is poor -- averaging 37 percent of students on free or reduced lunch -- but less than the percentage nationally, 56%.[8]

Disaggregated by grade level, some restructuring school differences with the comparable level in the universe of public schools are especially pronounced. The restructuring elementary schools, for example, enroll three times as many Hispanic students as other U.S public elementary schools (41 percent vs 13.5 percent). The restructuring high schools enroll more than twice as many black students as other U.S. public high schools (34 percent vs 15 percent).[9] Unlike the elementary and high schools in the restructuring sample, which enroll more minority students than their national counterparts, the restructuring middle schools enroll fewer -- 5 percent fewer Blacks and 2 percent fewer Hispanics. (Appendix A contains a complete comparative profile on these statistics for all three grade levels.)

Because the Center collected prior ability measures on the students in the core classes -- baseline tests using selected items from the NAEP reading and mathematics test and a center-designed writing test scored using the NAEP system -- student ability may also be compared to a national sample. These comparisons also vary by grade level. The elementary schools are at the national average in mathematics and slightly above in reading.[10] The middle schools rank well above the national average, especially in mathematics. The high schools fall considerably below the national average in mathematics and, even more, in reading. The high schools' low scores may be attributable, at least partially, to the discrepancy between the normed grade level for the high school test items (Grade 12) and the grade level of the students taking the test (Grade 10). (Appendix B contains the comparative profile on achievement for the restructuring schools against national norms for all three grade levels.)

Measures

Dependent variables Student engagement in academic work is constructed as a factor containing four component measures: *student effort* (In social studies/ mathematics class, how often

do you try as hard as you can?); *attentiveness* (How often do you pay attention in this class?); *lack of boredom in class* (Often I feel bored in this class, [reversed]); and *completing class assignments* (About how often do you complete your assignments for this class?). The internal consistency of this measure (Cronbach's alpha) is .69. Engagement as reported by students is substantially correlated with the level of engagement Center researchers observed in the classrooms of these same students, $r = .374$.[11] By providing a complementary objective assessment of classroom engagement levels, the observers' report validates the more subjective student rating. (Appendix C contains additional details on the dependent measure and all other variables incorporated in the investigation).

Independent variables measured on students. Orientation toward school is represented by two measures -- academic success and alienation. Academic success is operationalized by student grade point average in English, science, mathematics, and social studies, a proxy reflecting student integration with the goals of schooling. For elementary school students, alienation is measured as the mean of two standardized items: the frequency (during the year of the survey) with which a student was late for school and got into trouble for not following school rules. For middle and high school students, the measure of alienation also includes the frequency with which the student cut or skipped classes, was put on in-school suspension, or was put on probation or suspended from school.

Authentic work, constructed as a factor, consists of four component measures relating to the frequency with which the student is involved in meaningful academic experiences in the core mathematics or social studies class: (a) You are asked interesting questions and solve new problems; (b) You dig deeply into understanding a single topic; (c) You apply the subject to problems and situations in life outside of school; (d) You discuss your ideas about the subject with the teacher or students.[12]

Structures of support for learning is operationalized by three measures: (1) School support for learning, the mean of its standardized components, incorporates five items tapping students'

school experience -- whether the student is put down by other students (reversed), does not feel safe at school (reversed), finds that disruptions by other students get in the way of his or her learning (reversed), believes most teachers really listen to what she or he has to say, and thinks that she or he (and friends) are treated fairly. (2) Classroom support, a factor, reflects a combination of high expectations for achievement and help for learning from teachers and peers. (3) Parental support is constructed as an index. For elementary students, the index is the mean of two factors -- parental involvement at school and the frequency of discussion among students and their parents on academic matters. For secondary school students, the index includes a third factor -- the frequency with which students discuss their school program with their parents and, as well, their college plans, including taking the SAT or ACT examinations.

Self-concept measures students' attitudes about themselves and their competence from a series of personally evaluative items. The elementary students' measure comprises 5 items: I feel good about myself; I am a person of worth, the equal of other people; I am able to do things as well as most other people; at times, I think I am no good at all (reversed); and I feel I do not have much to be proud of (reversed). The secondary students' measure of self-concept includes two additional items: On the whole, I am satisfied with myself; and I feel useless at times (reversed).

Demographic measures include: gender (female), a dummy variable, coded (1=Female) (0=Male); race (Black) and ethnicity (Hispanic), each an effects-coded variable, (1=Black [or Hispanic]) (0=Hispanic [or Black]) (-1=White); and socioeconomic status. For elementary students, SES is the mean of household items and household features (summed and standardized). For secondary students, SES is the mean of household items and household features and the mean of parental education (summed and standardized). Prior achievement was measured early in the survey year as the student's score on a standardized test using NAEP items. Students in the mathematics core classes took a mathematics test; students in social studies core classes took a reading test and

submitted a writing sample, scored using a NAEP rubric. The social studies achievement score is the mean of the reading and writing test scores.

Independent variables measured on teachers and classrooms. Of the three independent variables typifying classroom context, two are aggregated from student data -- average prior achievement and the average level of authentic work. Subject area is a dummy variable, coded (1=Math) (0=Social Studies). Pedagogical approach, constructed from the responses of teachers to survey items, contrasts traditional methods (lecture, frequent tests and quizzes, drill and practice on the basics) with methods typically regarded as more progressive (students working in small groups; discussions; use of lab periods and hands-on activities; out-of-school activities, such as field trips and community experiences; individual students receiving teacher help; problem-solving or research requiring the organization and integration of knowledge).

Analytic Approach

The initial set of analyses examines observed mean differences on the modeled constructs by subject area and grade level. The examination employs two-way analysis of variance (ANOVA), which permits the simultaneous evaluation of the main effects (subject and level) and the possible interaction of these effects (subject-by-level). If differences occur in the relationships among the modeled constructs by grade level and subject, that interaction would have implications for the multivariate analyses to follow. Rather than investigate the theoretical model on the combined sample (i.e., for students in elementary, middle, and high schools simultaneously), it would be necessary to conduct the multivariate analyses separately by grade level, while controling for subject area.

Because the multivariate analyses involve nested data, students in classrooms, the principal analytic technique is multilevel, hierarchical linear modeling (HLM) (Bryk & Raudenbusch, 1992). HLM partitions the variance in the dependent variable into its within- and between-group components,

in this instance, classrooms. The HLM analysis, accordingly, employs two equations: (a) a within-group model that explains variation in the outcome for each classroom as a function of individual characteristics and random error, and (b) a between-group model that explains the variation in the outcome as a function of the differing charracteristics of classrooms and a more complex error term (Bryk & Raudenbusch). Appendix D conttains technical details on the HLM models employed in this investigation.

An unconditional HLM model (i.e., a model with no predictors at either the within-group or between-group levels) serves to estimate how much variability in student engagement exists within- and between-classrooms and is potentially explainable by the analyses. Unlike much research employing HLM primarily to explain between-group differences, this investigation is equally aimed at explaining within-group variation in engagement. The within-classroom HLM model provides parameter estimates of the structural relationships hypothesized to influence engagement, controling for personal background differences.[13] The between-classroom model, adjusted for within-classroom differences and for random between-classroom effects, investigates why average student engagement is higher in some classrooms than in others.

Results

Descriptive Analyses

Grade level differences. Engagement in academic work, unadjusted for any other influences, declines as grade level increases (Table 2). While elementary students report being most engaged and high school students least, middle school students rank between them, less involved than students in elementary school, but more involved than their high school counterparts. Overall, students in mathematics classes report greater engagement than their peers in social studies, but the presence of a

significant subject-by-level interaction indicates that the subject area effect varies significantly by grade level. Figure 2 displays the interaction in deviation score metric. While students in all three grade levels rank almost the same in mathematics engagement, only middle school students rank about as high in social studies engagement. Engagement in social studies is relatively very low for students in elementary and high schools.

Insert Table 2 about here

Measured by their comparatively low level of academic success (GPA) and their comparatively high level of alienation, high school students report the least positive orientation toward school. Among students in the core class subject areas, differences in the levels of tardiness and rule-breaking are not significant. Cutting class and being suspended is more common among the social studies students. Although authentic academic work does not vary by grade level, it does vary by subject area. Mathematics students report higher levels of authentic work than their peers in social studies.

Insert Figure 2 about here

Support structures for learning tend to vary both by grade level and subject area. While perceptions of their school as a positive learning environment do not vary among students by grade level, they do vary by subject area. Students in mathematics classes are more likely to regard their school environments as supportive. Classroom support, on average, is greatest among elementary school students and among mathematics students. The presence of a significant subject-by-level interaction indicates that the mathematics effect is not consistent over grade levels. In fact, elementary school students report greater levels of classroom support for learning in social studies than in mathematics, while middle and high school students report greater support for learning in mathematics. Elementary school students also experience greater parental interest in and involvement

with their schooling than do middle and high school students. Among the secondary school students, those in high school report more conversations with their parents about their school programs and college preparation plans than students in middle schools do.

The proportions of girls at all school levels and in core subject classes is statistically equivalent to the proportions of boys. Considered by racial or ethnic background, however, the distribution of students varies among these groups. The proportion of Black students is highest in high schools and greater in mathematics than in social studies classes. Hispanic students are most numerous at the elementary level, but equally likely to be in mathematics as in social studies classes.

Social class, measured by household items and other household features, is highest for middle school students. A significant grade level by subject interaction is present, however. While elementary and high school mathematics students rank above their classmates in social studies on social class, among middle school students the SES of social studies students exceeds that of their peers in mathematics class. Middle school students' parents have attained higher levels of education (almost 15 years of formal schooling compared to just over 13.5 years for high school students' parents). Parents of students in social studies have averaged a few months more of formal education than have mathematics class parents' (14.4 vs 14.2 years of schooling). Elementary school students are most positive in self-concept, a characteristic that does not vary by subject area.

Prior achievement on the standardized baseline test is highest for elementary school students and, generally, for students in social studies. An exception exists, however, as the interaction indicates. Compared to middle and high school students, for whom the reverse is true, elementary school students rank higher on baseline achievement in mathematics than they do in social studies.

Classroom characteristics differ somewhat for students by level and subject (Table 3). The average prior achievement level of students is highest for elementary school classrooms and higher for social studies, except at the elementary school level where mathematics students outscored their

counterparts in social studies. In both elementary and middle school classrooms, the average level of authentic student work is higher than in high school classrooms. Overall, the level of authentic work reported by students in mathematics classes tops that of social studies. At all three grade levels, teachers use progressive and traditional teaching methods with comparable frequency. Progressive methods are somewhat more prevalent in social studies classes, however, and traditional methods slightly more common in mathematics classes.

Insert table 3 about here

Multivariate HLM Analyses

Because of the subject-by-level interaction explained above on the dependent variable, the multivariate HLM analyses will be conducted separately by grade level. While statistical considerations necessitate the strategy, conducting separate analyses by grade level permits the testing of the theoretical model for engagement at three different levels of schooling. If the patterns prove similar for students at all three grade levels, the model can be considered generally appropriate and educationally applicable across grade levels.

The first of the HLM analyses employs an unconditional model to provide estimates on the psychometric properties of the dependent measure. These estimates include the amount of variance partitioned within- and between-classrooms and the reliability of the outcome as an estimate of the true classroom mean. At all three grade levels, most of the variance in engagement occurs within classrooms (Table 4) -- a high of 86% at the high school level, a low of 80% at the middle school level. Thus, engagement is largely a function of individual student characteristics and experiences. Between classroom variance is greatest among the elementary school classrooms (17%), least among high school classrooms (9%). The HLM estimate of the reliability of the dependent variable,

reflecting both variation in the means across classrooms and the sample size, is highest at the elementary level (.83) and lowest at the high school level (.67).

The intraclass correlation represents an adjusted estimate of the between-classroom variability for engagement among the grade levels that takes into account both the amount of within-classroom variability and the internal consistency of the dependent variable.[14] With these adjustments, the amount of between-classroom variability is somewhat larger than the estimates provided above -- 26% for elementary schools, 19% for middle schools, and 13% for high schools. The theoretical model proposed earlier will attempt to explain the variability in engagement that exists within- and between-classrooms.

Insert table 4 about here

Within-classroom HLM model. The theoretical model exhibits a strikingly similar pattern of relationships for engagement in academic work at all three grade levels. Table 5 displays these results in effect size metric.[15] At all three grade levels, students' basic orientation toward school strongly influences their academic application in the classroom. The salience of previous success is greatest for high school students (ES = .78, $P \leq .001$). Although the relationship is still very strong, previous success influences engagement comparatively less for middle school students (ES = .56, $P \leq .001$). Elementary school students rank between students at the other two levels in the importance of previous success to engagement (ES = .61, $P \leq .001$). Alienation toward schooling seriously detracts from classroom engagement for students at all grade levels. Alienation from school is especially detrimental to classroom engagement for middle school students (ES = -.81, $P \leq .001$) and high school students (ES = -.71, $P \leq .001$), less so among elementary school students (ES = -.50, $P \leq .001$).

For students at all three grade levels, authentic academic work is the most powerful contributor to engagement. For middle school students, the effect of authentic work is most striking (ES = .96, $P \leq .001$) and somewhat less so for high school students (ES = .82, $P \leq .001$). Although the engagement of students at all levels benefits from support structures for learning, high school students profit most. The total effect of support structures for learning (school, classroom, and parental support summed) is greatest for high school students (ES = 1.40), followed by middle school (ES = 1.01) and elementary school students (ES = .95).

For elementary school students, of all the support structures, regarding school as supportive to learning has the strongest relationship to classroom engagement (ES = .39, $P \leq .001$). Parental support is the least important (ES = .22, $P \leq .001$). For middle and high school students, parental support is a slightly more important influence on engagement than is the learning environment of the students' school. Most important of these structures for high and middle school students, however, is support for learning within the classroom (ES = .70) and (ES = .49), respectively. For elementary students, classroom support (ES = .34, $P \leq .001$) influences engagement somewhat less than the school environment, but more strongly than parental support.

At all three grade levels, but especially among middle and high school students, female gender increases the likelihood of classroom engagement (for middle and high school students, ES = .48 and .47, respectively, $P \leq .05$.; for elementary students, ES = .38, $P \leq .01$). A positive self-concept most enhances engagement for middle school students (ES = .39, $P \leq .01$), less so for elementary and high school students (ES = .24, $P \leq .01$, and ES = .22, $P \leq .05$, repectively).

The theoretical model explains about thirty percent of the within-classroom variation in engagement for students at all three grade levels -- less for elementary and middle school students (29%), more for high school students (32%).

Insert table 5 about here

Between-classroom HLM model. The between-classroom HLM model adjusts for the modeled within-classroom differences. Unlike the student-level (within classroom) relationships discussed above which were similar for students at all three grade levels, classroom effects on engagement differ by grade level and subject (Table 6). For elementary and high school students, mathematics classrooms produce much higher levels of engagement (ES = 1.00 and .92, respectively, $P \leq .01$), but for middle school students engagement is weaker in mathematics classrooms (ES = -.70, $P \leq .05$).

Insert table 6 about here

The average prior achievement level of the class proved to have no relationship with student engagement, thus that contextual feature of classrooms does not appear in the final model. Authentic work as a feature of classroom context is important, however, in the upper grades, especially in high school, as an influence on average student engagement. Among elementary schools the level of authentic work reported by students in the classroom does not influence average levels of classroom engagement. In middle and high schools, however, this contextual feature strongly differentiates engagement levels among classrooms (ES = .46, $P \leq .05$, and ES = .66, $P \leq .001$, respectively).

In high school classrooms, once the subject area and average level of authentic work is taken into account, engagement is independent of the pedagogical approach of teachers. Whether the teacher typically employs progressive or traditional teaching methods, given these adjustments, is irrelevant. Progressive methods do not significantly enhance the engagement of middle school students, but traditional methods do (ES = .53, $P \leq .05$). Among elementary school students,

progressive pedagogy is associated with lower levels of classroom engagement (ES = -.40, $P \leq .05$), and traditional pedagogy with higher levels (ES = .53, $P \leq .05$).

The findings on the relationship of pedagogy to student engagement -- particularly the positive relationship of traditional methods in elementary and middle school classrooms and the negative relationship of progressive pedagaogy in elementary schools -- are somewhat surprising. An item analysis of the relationship to engagement of each component in the progressive and traditional pedagogy constructs is instructive in accounting for these findings. (See Appendix C for a list of items comprising the traditional and progressive pedagogical constructs.) For elementary school students, the traditional approach of frequent tests and quizzes is positively associated with higher levels of engagement (.22), while teachers' working with individual students is negatively associated (-.13) with average classroom involvement. Among middle school students, two components of traditional pedagogy have a positive relationship with engagement -- frequent tests and quizzes (.26) and an emphasis on basic skills and procedures (.28).

Discussion

Summary of the Findings

Confirming the aptness of the theoretical constructs hypothesized to influence student engagement in academic work, the investigation supported students' integration with the goals of schooling as salient to classroom involvement. Academic success made engagement more likely, while alienation from school, defined as at-risk behavior, seriously reduced the likelihood of classroom engagement. Authentic academic work exerted a powerful influence on engagement. When students experienced a well-developed support system for learning -- at home, in school, and in the classroom -- they reported substantially higher levels of classroom engagement. Self-concept,

representing a motive to develop and express competence, proved a moderately important influence on engagement. Net of these theoretically salient features, girls were considerably more likely than boys to report involvement in academic work.

At the classroom level, mathematics classes engaged elementary and high school students much more than social studies, while social studies proved almost as engaging as math for middle school students. A classroom context characterized by high levels of authentic work enhances the engagement of middle and high school students. When subject area and the level of authentic work are taken into account, traditional methods (specifically, frequent tests and quizzes) account for an increase in the engagement of elementary and middle school students. Lower levels of classroom engagement are common in elementary schools when teachers report an emphasis on giving extra time and attention to individual students.

Notably, social class and race-ethnicity did not differentiate the extent to which students within classrooms reported engagement in academic work. Since most previous research on student engagement documented the influence of social background, the absence of such effects may be a consequence of the efforts restructuring schools are making on behalf of equity. The finding that girls are more academically involved than boys is consistent with the findings of previous research on engagement. Girls' engagement may reflect a greater concern on their part for academic performance than boys have (Dweck, 1986), perhaps a result of socialization patterns (Maccoby & Jacklin, 1974) or of the differential expectations of teachers (see, for example, Wilkinson & Marrett, 1985).

The pattern of subject matter, contextual, and pedagogical relationships with engagement differs among classrooms by grade level. Mathematics classes rank higher on engagement for elementary and high school students, but lower for middle school. Authentic work as a feature of classroom context influences the engagement level of middle and high school classes, but is not a significant factor in the engagement levels of elementary school classes.[16] An item analysis of

pedagogical techniques indicates that classroom engagement for elementary and middle school students increases as a function of frequent tests and quizzes. Classes emphasizing basic skills, net of discipline and context, have a positive relationship with engagement in middle school classrooms.

Contribution to Research and Practice

The focus on student engagement as an outcome of schooling and as antidote to the ultimate act of disengagement, dropping out, has stimulated an interest in engagement theory. Because engagement with academic work is fundamental to students' social development and intellectual achievement, understanding the structures and processes that influence student engagement is indispensable for subsequent research and the formation of policy. By investigating a model of engagement entailing within- and between-classroom propositions, this study has added a new piece to the emerging body of literature on student engagement. From a sociological perspective, this study has evaluated and confirmed the importance of authentic academic work and structures of support for learning.

Disciplinary differences. Subject area clearly differentiated classrooms in their average levels of student engagement. With adjustments for within-classroom student differences and between-classroom contextual differences, mathematics classes outranked social studies in the level of student engagement. Because the observers found the levels of authentic instruction equivalent in mathematic and social studies, the finding lends support to the influence on engagement of inherent disciplinary characteristics. Although current reform in mathematics education has introduced innovative curricular and instructional approaches, as a basic subject mathematics is more structured than social studies. Despite some variation, content selection is typically sequential and predictable.

Because mathematics teachers must prepare students for the next level of instruction by ensuring their mastery of present material, moreover, they may press harder for student engagement. Mathematics teachers (and students) may also be more vulnerable to the externally imposed pressure of standardized testing (Stodolsky et al., 1992). Students' perceived dependency on instruction for acquiring mathematics knowledge and the "public" evaluation that tends to typify mathematics more than social studies classes may also account for their greater engagement in mathematics classes (Stodolsky et al.). Perhaps social studies teachers', in their concern for students' developing positive attitudes and values as well as social knowledge, press less for students' engagement in academic work than for students' demonstrating good human relations and understanding of cultural differences.

Progressive vs Traditional Methods. A surprising finding in these analyses concerned instructional methods. Net of authentic work and subject matter, progressive methods exerted no positive influence on student engagement in academic work, while traditional methods did. As suggested earlier, because traditional instruction as operationalized in this study incorporates an emphasis on frequent tests and quizzes, academic accountability may motivate student engagement when the instruction is traditional.

The failure of progressive methods in themselves to bring about student engagement suggests that when progressive methods are uncoupled from content, they are ineffectual in promoting sustained engagement (Newmann, Secada & Wehlage, 1994). Without challenging content and a clear focus of inquiry, for example, cooperative groups could be intellectually meaningless and boring exercises for students. Independent research could involve students in delving into encyclopedias and other reference books to amass facts about a particular subject, but lack a compelling problem or question to make the research an intellectually meaningful endeavor. Thus, while such student-centered methods are generally consistent with the direction of authentic student work, student-centered methods are not sufficient to ensure students' engagement.

Restructuring and academic engagement. A key question for research evaluating the effects of restructuring on students' experience of school is whether generalized restructuring efforts are sufficient to make a qualitative difference in student outcomes, such as engagement and achievement, or whether restructuring requires specific content to bring about specifically sought results (Newmann, 1992; Wehlage et al., 1992). Students' commitment to academic effort depends on the intellectual substance and quality of pedagogy, according to the latter theory, such as authentic instruction and authentic work. The importance of focused, intellectually oriented rationales and content not withstanding, Lee & Smith (1993, 1994) found that generalized restructuring -- conceptualized as a movement from bureaucratic to organic school organization and an increased emphasis on academics -- presumably affected the school experience of students in ways that enhanced academic engagement.

While not refuting the positive influence of generalized restructuring (organic rather than bureaucratic school organization, for example) on student engagement, this investigation provides support for the importance of intellectual substance and quality in school restrucuring initiatives. Within a sample of nationally selected restructuring schools, chosen because of significant innovation in student experience and the professional life of teachers, considerable variation exists in student engagement. Specific restructuring content -- such as authentic academic work and structures of support for learning -- proved important in raising student engagement even where generalized restructuring was taking place.

Technical Notes

[1] In the 1980s the dropout rate was especially high for minority students. While the dropout rate for white students during the decade ranged from 10-13%, for Blacks the rate ranged from 16-24%, and for Hispanics, from 28-44% (National Center for Education Statistics, 1993). In some central city high schools, over half the students drop out before graduation (Bryk & Thum, 1989).

[2] Investigating the relationship of engagement to the achievement of the students who are the focus of this study, the Center on the Organization and Restructuring of schools' preliminary analyses of three years of data has also found a positive and significant relationship between student engagement and achievement (net of social background and prior achievement).

[3] The hypothesized influence of structures of support for learning on student academic engagement is consistent with Bronfenbrenner's (1986) theory of the importance of mesosystems in nurturing human development. A mesosystem is a system of microsystems, such as peer group, classroom, school, family, schoolwork. The notion of a mesosystem implies the connection between two or more systems in the person's experiential framework. For students who have a substantial mesosystem working for them (i.e., providing support), engagement is likely to be high. To the extent students lack a supportive mesosystem, engagement is likely to be low.

[4] Criteria also included progress in restructuring of school governance, management, and leadership and in the coordination of community resources.

[5] In addition to the teachers and students in the core classes, all teachers in each school and all students in the targeted grade level for each school were surveyed.

[6] The elementary student survey is an abbreviated version of the survey administered to secondary (middle and high school) students. Most items in the elementary school survey have an identical counterpart item on the secondary school survey. In some instances, however, the range of response options differs for the two levels. When such differences occur, the item is rescaled -- either through collapsing the item into common categories or standardizing the item, first on its sample (i.e., elementary or secondary), then re-standardized on the entire sample.

[7] Because of a scheduling innovation, one of the restructuring schools in the sample, provided 11 core classes for the study. Since only one of the core classes observed during the fall visit continued into the winter trimester (when the majority of the original core students were involved in an internship program), 5 new core classes were added (2 social studies, 3 mathematics). Although their students and sometimes their class titles changed, the core teachers themselves remained the same for both semesters. Thus, while the study involves 144 core teachers, the total number of core classes is actually 149.

[8] J. Derr, U.S. Department of Agriculture, Food and Nutrition Services, Child Division (personal communication, October 12, 1994).

[9] The larger over-representation of Hispanic students at the elementary school level and of Black students at the high school level is influenced considerably by the almost total minority populations of two of the elementary schools and one of the high schools.

[10] Because the center assigned its own topic for student writing and evaluated the writing sample using its own norms for scoring, the writing scores of the restructuring schools sample are not appropriately compared with the scores of the NAEP sample.

[11] Criteria for measuring observed engagement ranged from its lack -- disruptive disengagement -- to its full expression -- all or almost all students seriously involved in the substance of the lesson throughout the class. Being on-task, paying attention, doing the assigned work, exhibiting interest, taking initiative, interacting cooperatively with others in classroom activities signaled engagement to the observers (Center on Organization and Restructuring of Schools, 1992).

[12] Each of these items corresponds to a standard of authentic instruction on which observers rated the core classes. Students' reports of being asked interesting questions and solving new problems corresponds to observed higher order thinking; digging deeply into understanding a single topic, to observed depth of knowledge; applying the subject to problems and situations in life outside of school, to observed connectedness; discussing ideas about the subject with the teacher or other students, to observed substantive conversation.

The correlations between student reports of authentic instructional activity and observed authentic instruction are stisticaly significant: for higher order thinking, $r=.232$; for depth, $r=.270$; for connection to the world beyond the classroom, $r=.146$; for substantive conversation, $r=.272$. The correlations are computed from student reports of instruction aggregated to the classroom level in relation to the average rating of observed instruction over four time points.

[13] For these analyses the continuous independent variables are centered around the grand mean. All of the independent variables are, in HLM terminology, fixed -- that is, the slopes do not vary randomly between classrooms.

[14] The intraclass correlation is computed as the ratio of the between-classroom variance (tau) to the total variance (tau + sigma-squared) with sigma-squared adjusted for measurement error.

[15] Use of the effect size metric provides a benchmark for answering the question sometimes posed to educational researchers: How important (i.e., "big" or "small") is the relationship reflected by the coefficient? The effect size metric is expressed in standard deviation units, computed by dividing the HLM gamma coefficient (standardized for continuous variables [M=0, SD=1], otherwise dummy-coded [0,1]) by the HLM-estimated standard deviation for the appropriate outcome variable. An effect size is small if it is less than .1; moderate, if between .2 and .5; large, if over .5 (Cohen, 1977; Rosenthal & Rosnow, 1984).

[16] This phenomenon recalls the observation made by Goodlad (1984) that elementary school students appeared to be more engaged than students at other grade levels, although nothing about the classroom context or pedagogical process seemed to warrant that engagement.

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Table 1
Definition of the Analytic Sample

	Mathematics	Social Studies	Combined
		Classrooms	
Elementary	24	24	48
Middle	23	23	46
High	24	25	49
Total	71	72	143
		Students	
Elementary	688	660	1348
Middle	535	616	1151
High	542	628	1170
Total	1765	1904	3669

Table 2
Profile of Elementary, Middle, and High School Students in Mathematics and Social Studies Classrooms:
A Two-Way Analysis of Variance with Interactions

	Level			Subject		
Variables	Elementary (N=1348)	Middle (N=1151)	High (N=1170)	Mathematics (N=1765)	Social Studies (N=1904)	Interactions
Engagement with Academic Work	3.95 ***	3.80	3.69	3.92 ***	3.72	*
Orientation toward School						
Success (GPA)	3.09	3.13 ***	2.75	3.01	2.99	ns
Alienation						
Times Tardy, Broke Rules	4.52	4.12	5.28 ***	4.48	4.79	ns
Times Cut Class, Suspended	----	1.24	3.16 ***	2.44 *	1.95	ns
Authentic Academic Work	2.94	2.95	2.92	3.01 ***	2.86	ns
Support Structures for Learning						
School	2.87	2.89	2.84	2.89 *	2.85	ns
Classroom	3.21 ***	3.13	3.11	3.18 *	3.13	**
Parental						
Talk School; Attend Events	8.12 ***	7.89	7.60	7.97	7.81	ns
Talk Program, College, SATs	----	2.82	3.29 ***	3.09	3.03	ns
Personal and Academic Background						
% Female	51.0	53.0	52.0	50.0	53.0	ns
% Black	15.0	10.0	31.0 ***	20.0 *	17.0	ns
% Hispanic	36.0 ***	11.0	15.0	21.0	22.0	ns
Socio-Economic Status						
# Household Items, Features	6.2	6.9 ***	6.1	6.4	6.4	*
Parents' Education Level	----	14.9 ***	13.7	14.2	14.4 ***	ns
Self-Concept	3.24 ***	3.09	3.15	3.17	3.16	ns
Baseline Achievement	61.0 ***	55.0	51.0	56.0	57.0 ***	***

ns not significant; * $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$

42

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Table 3
Selected Characteristics of Elementary, Middle, and High School Mathematics and Social Studies Classrooms: A Two-Way Analysis of Variance with Interactions

	Level			Subject		
Variables	Elementary (N=48)	Middle (N=46)	High (N=49)	Mathematics (N=71)	Social Studies (N=72)	Interactions
Average Baseline Ability	.60 ***	.55	.50	.53	.57 ~	*
Average Level Authentic Work	2.95 ***	2.95	2.90	3.00 *	2.86	ns
% Time Progressive Methods	75.0	70.0	69.0	69.0	74.0 *	ns
% Time Traditional Methods	25.0	30.0	31.0	31.0 *	26.0	ns

ns not significant; * $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$

Table 4
Student Engagement in Academic Work: HLM Estimates of Psychometric Properties (N = 3,369 students, 143 classrooms)

	Dependent Variable		
	Engagement in Academic Work		
	Elementary	Middle	High
Within-Classroom Variance (Sigma-Squared)[a]	.82	.80	.86
Between-Classroom Variance (Tau)	.17	.13	.09
Reliability	.83	.77	.67
Intraclass Correlation	.26	.19	.13

[a]Parameter estimates are computed with a fully unconditional HLM model.

[b]The intraclass correlation for engagement in academic work is the amount of between-classroom variance explainable by the HLM analyses. The intraclass correlation is computed with the within-classroom variance adjusted for the reliability (Cronbach's α) of the dependent measure: for elementary students, .60; middle school students, .73; high school students, .73.

Table 5
Student Engagement in Academic Work: HLM Within-School Models

	Dependent Variable		
	Engagement in Academic Work		
Variables	Elementary	Middle	High
Intercept (Classroom Average)	-.15	-.18	-.25
Orientation toward School			
Success	.61 ***	.56 ***	.78 ***
Alienation	-.50 ***	-.83 ***	-.71 ***
Authentic Academic Work	.68 ***	.96 ***	.82 ***
Support Structures for Learning			
School	.39 ***	.25 *	.32 **
Classroom	.34 ***	.49 ***	.70 ***
Parental	.22 ***	.27 *	.38 ***
Personal and Academic Background			
Female	.38 **	.48 *	.47 *
Self-Concept	.24 **	.39 **	.22 *
% Within-Classroom Variance Explained	29.4 %	28.7 %	32.1 %

* $P \leq .05$ ** $P \leq .01$ *** $P \leq .001$

[a]The effects displayed in this table are in a standardized metric, computed by dividing the HLM gamma coefficient for the outcome variable by the adjusted school-level standard deviation for that outcome computed by HLM.

Table 6
Student Engagement in Academic Work: HLM Between-Classroom Model

	Dependent Variable		
	Engagement in Academic Work		
	Elementary	Middle	High
Effects on Mean Between-Classroom Outcome[a]			
Intercept	-.65 **	.12	-.74 **
Classroom Contextual Features			
Mathematics Classroom	1.00 **	-.70 *	.92 **
Average Level of Authentic Work	.12	.46 *	.66 ***
Pedagogical Influence			
Progressive Methods	-.40 *	-.28	-.24
Traditional Methods	.41 *	.53 *	.30
% Between-Classroom Variance Explained	64.5 %	69.2 %	65.2 %

[a]The effects displayed in this table are in a standardized metric, computed by dividing the HLM gamma coefficient for each outcome by the adjusted school-level standard deviation for that outcome computed by HLM.

APPENDIX A

Social Characteristics of Schools: Restructuring Schools Sample and the Universe of U.S. Public Schools Compared[a]

	Universe of U.S. Public Schools	Restructuring Schools Sample
Elementary School Level		
Size	447	636
% Black	16.2	16.4
% Hispanic	13.5	41.0
% Free or Reduced Lunch	24.1	51.8
Middle School Level		
Size	576	646
% Black	16.1	11.1
% Hispanic	12.4	10.4
% Free or Reduced Lunch	19.9	28.7
High School Level		
Size	714	1050
% Black	14.6	34.3
% Hispanic	11.3	13.7
% Free or Reduced Lunch	11.8	30.0
All Levels Combined		
Size	522	777
% Black	16.3	20.6
% Hispanic	11.8	21.7
% Free or Reduced Lunch	----	36.8

[a] Statistics on the Universe of Public Schools were provided by the National Center for Education Statistics from the Common Core of Data (faxed communications, March 25, 1994 and May 24, 1994). The statistics on the percentage of students receiving free and reduced lunch are based on reports from about 65% of all U.S. public schools. Statistics on size and minority enrollment (except for all levels combined) are based on reports from 93% of all U.S. public schools. For all levels combined, the Office of Civil Rights provided the data on minority enrollment for the universe of public schools (S. Tuchman, personal communication, May 24, 1994).

APPENDIX B

Comparison of Reading and Mathematics Scores by Grade Level for Selected NAEP Items for National and Restructuring Study Samples

	Normed Grade	National Average	Restructuring Schools Average
Elementary Schools			
Reading	4	.66	.68
Mathematics	4	.64	.64
Middle Schools			
Reading	8	.59	.65
Mathematics	8	.44	.51
High Schools			
Reading	12	.67	.54
Mathematics	12	.58	.49

APPENDIX C

CONSTRUCTION OF VARIABLES

Construct and Components

STUDENTS

	Range	Mean	SD
Student Engagement			
• In social studies/mathematics class, how often do you try as hard as you can?	1 - 5	4.4	.94
• How often do you complete your assignments for this class?	1 - 5	4.2	.89
• How often do you pay attention in this class?	1 - 5	4.1	.84
• How often do you feel bored in class?	1 - 5	2.5	.92
Cronbach's α = .70. Composite measure: factor; exponentially transformed and standardized.	-2.5 - 1.8	0.0	1.0
Orientation toward School			
(1) Success			
• GPA in English, Social Studies, Mathematics and Science; mean of 4 grades	.50 - 4	3.0	.78
(2) Alienation			
• I was late for school.	0 - 10	2.8	3.3
• I got in trouble for not following school rules.	0 - 10	1.9	2.9
Cronbach's α = .33. Composite measure: sum of standardized items.	0 - 10	1.0	
Secondary students only:			
• I cut or skipped class.	0 - 10	1.4	2.8
• I was put on in-school suspension.	0 - 10	.5	1.6
• I was suspended or put on probation from school.	0 - 10	.4	1.4
Cronbach's α (secondary students' items) = .68; combined sets of items, α = .73. Composite measure: mean of summed scales, standardized; logarithmically transformed and standardized.	-1.18 - 5.80	0.0	1.0

Authentic Work

• You are asked interesting questions and solve new problems.	1 - 4	2.9	.95
• You dig deeply into understanding a single topic.	1 - 4	3.1	.91
• You apply the subject to problems and situations in life outside of school.	1 - 4	2.7	1.6
• You discuss ideas about the subject with the teacher or students.	1 - 4	3.0	1.0
Cronbach's α = .66. Composite measure: factor.	-3.0 - 1.9	0.0	1.0

Support Structures for Learning

(1) School

• In school I often feel "put down" by other students (Rev.).	1 - 4	2.7	.93
• Most of my teachers really listen to what I have to say.	1 - 4	3.1	.79
• I don't feel safe at this school (Rev.).	1 - 4	3.2	.88
• Disruptions by other students get in the way of my learning (Rev.).	1 - 4	2.4	.89
• My friends and I are treated fairly in this school.	1 - 4	3.0	.84

Cronbach's α = .51. Composite measure: mean of standardized components; exponentially transformed; standardized.

(2) Classroom

• The teacher expects me to do my best all the time.	1 - 4	3.2	.77
• The teacher gives me extra help when I don't understand something.	1 - 4	3.4	.79
• My friends and I help each other with our homework.	1 - 4	2.9	.82
Cronbach's α = .40. Composite measure: factor.	-2.67 - 2.04	0.0	1.0

(3) Parental Support for Learning Index

Since the beginning of the school year, how often did Your parent(s), guardian(s), or other family members:

• Attend a school meeting	0 - 2	1.0	.75
• Phone or speak to your teacher or counselor	0 - 2	.95	.73
• Attend a school event in which you participated	0 - 2	1.1	.80
• Act as a volunteer at your school			

Since the beginning of this school year, how often have you and your parent(s), guardian(s), or other family members discussed:

•School activities or events of interest to you	0 - 2	1.3	.67
•Things you have studied in class	0 - 2	1.3	.66

•Your grades	0 - 2	1.6	.61
•Transferring to another school	0 - 2	.48	.70
Cronbach's α = .66. Composite measure: sum of 8 components.	0 - 16	7.9	3.0
Secondary students only:			
•Selecting courses or programs at school	0 - 2	1.1	.69
•Plans and preparation for ACT or SAT tests	0 - 2	.59	.71
•Going to college	0 - 2	1.4	.73
Cronbach's α = .59. Composite measure: sum of 3 items.	0 - 6	3.1	1.6
Cronbach's α for all parent items = .73. Composite measure: (secondary students) mean of standardized scales; standardized.	-2.8 - 2.5	0.0	1.0
Personal Background			
(1) Demographic Characteristics			
• Female Gender: Coded Female=1; Male=0	0 - 1	.51	.50
• Black: Coded Black=1; Hispanic=0; White, Other=-1	-1 - 1	-.27	.75
• Hispanic: Coded Hispanic=1; Black=0; White, Other=-1	-1 - 1	-.23	.70
(2) **Socioeconomic Status**			
Household Items/Features	0 - 10	6.4	2.5
Secondary students only:			
Parents' Education	10 - 18	14.2	2.3
(3) **Self-Concept**			
• I feel good about myself.	1 - 4	3.3	.73
• I am a person of worth, the equal of other people.	1 - 4	3.3	.71
• I am able to do things as well as most other people.	1 - 4	3.3	.70
• At times, I think I am no good at all (rev.).	1 - 4	2.9	.95
• I feel I do not have much to be proud of (rev).	1 - 4	3.2	.90
Cronbach's α = .76. Composite measure: mean, 5 items.	1 - 4	3.2	.57
Secondary students only:			
• On the whole, I am satisfied with myself.	1 - 4	3.2	.74
• I feel useless at times (rev.).	1 - 4	2.7	.87
Cronbach's α (7 items) = .86. Composite measure: mean, 7 items.	1 - 4	3.2	.57

(4) **Baseline Test**

• For students in math core classes, the score on items from the NAEP math test appropriate to grade level. The score is computed as the ratio of items correct to total items.	0 - 1.0	.48	.50
• For students in social studies core classes, the average of the score on items from the NAEP social studies test appropriate to grade level and of the score on a writing sample assessed using NAEP rubrics. The score is computed as the ratio of items correct to total items.	0 - 1.0	.57	.15

CLASSROOMS

Contextual Features

(1) **Average Authentic Work** Authentic work is aggregated to classroom level.	2.2 - 3.5	2.9	.25
(2) **Subject Area** Math: Coded Mathematics = 1; Social Studies = 0	0 - 1	.5	.5

Pedagogical Influence

(1) **Methods: Traditional**

During a typical week, how much total time (hours) do you spend:			
• lecturing to the class as whole?	0 - 5	1.3	.98
• in drill and practice on basic facts, definitions, computations, skills, or procedures?	0 - 5	1.5	1.3
• giving tests or quizzes?	0 - 3	.74	.64
Cronbach's α = .82. Composite measure: factor.	-2.5 - 2.2	0.0	1.0

(2) **Methods: Progressive**

During a typical week, how much total time do you spend:			
• leading discussions?	0 - 5	1.4	1.3
• providing instruction to individual students?	0 - 5	1.4	1.3
• conducting lab periods or other hands-on activities?	0 - 5		
During a typical week, how much total time do students spend:			
• class time for outside activities (field trips, library, community experiences, etc.)?	0 - 5	.55	.86
• working in small groups?	0 - 5	2.2	1.5
Cronbach's α = .84. Composite measure: factor.	-2.1 - 2.1	0.0	1.0

Appendix D

Estimation of parameter variance. The unconditional HLM model, employed as a oneway analysis of variance with random effects model, estimates the within- and between-classroom variance in student engagement. The combined HLM model for this analysis may be represented as follows:

$$Y_{ij} = \gamma_{00} + U_{0j} + r_{ij}$$

with Y_{ij} the level of engagement (e.g., academic application) for individual i in classroom j; γ_{00} the grand mean; U_{0j}, the classroom effect; and r_{ij}, the individual effect. According to this model, the variance of the outcome is:

$$Var(Y_{ij}) = Var(U_{0j} + r_{ij}) = \tau_{00} + \sigma^2$$

with τ representing the between-classroom variability and σ^2 representing the within-classroom variability.

The within-classroom model. The within-classroom (level one) model for this analysis contains individual predictors for academic experiences (authentic work, social support, and demonstrated understanding), social integration (attitudes toward school, conduct), and personal background (parental support for learning, gender, GPA). To investigate the academic application for student i in classroom j, that is, Y_{ij}, using the within-classroom model, the equation is:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + \ldots + \beta_{kj}X_{kij} + r_{ij}$$

with β_{0j} the mean for classroom j; β_{jk}s, the coefficients representing the relationship with academic application for each measured student characteristic in classroom j; and r_{ij} the within-classroom error, assumed to be normally distributed $(0,\sigma^2)$. In this model, when the relationship of the measured characteristics of students to academic application did not vary significantly between classrooms, the parameters (except for dummy variables) are centered around the grand mean $(X_{ij} - X..)$, and they are fixed, i.e., set to 0, rather than allowed to vary randomly between classrooms. Because the relationship between authentic work and academic application varies significantly between classrooms, it is centered around the classroom mean $(X_{ij} - X._j)$ and modeled as a randomly varying slope.

The between-classroom model. The between classroom (level two) equation models academic application, adjusted for student characteristics, as a function of teachers' professional practice (disciplinary competence and methods), an explanatory contextual feature (the average level of authentic work), and controls (level, subject area, and average prior achievement:

$$\beta_{jk} = \gamma_{0k} + \gamma_{1k}W_{1j} + \gamma_{2k}W_{2j} + \ldots + \gamma_{pk}W_{pj} + U_{jk}.$$

with W_j representing a between-classroom predictor.

Figure 1
Student Engagement in Academic Work: A Theoretical Model Incorporating Student and Classroom Influences

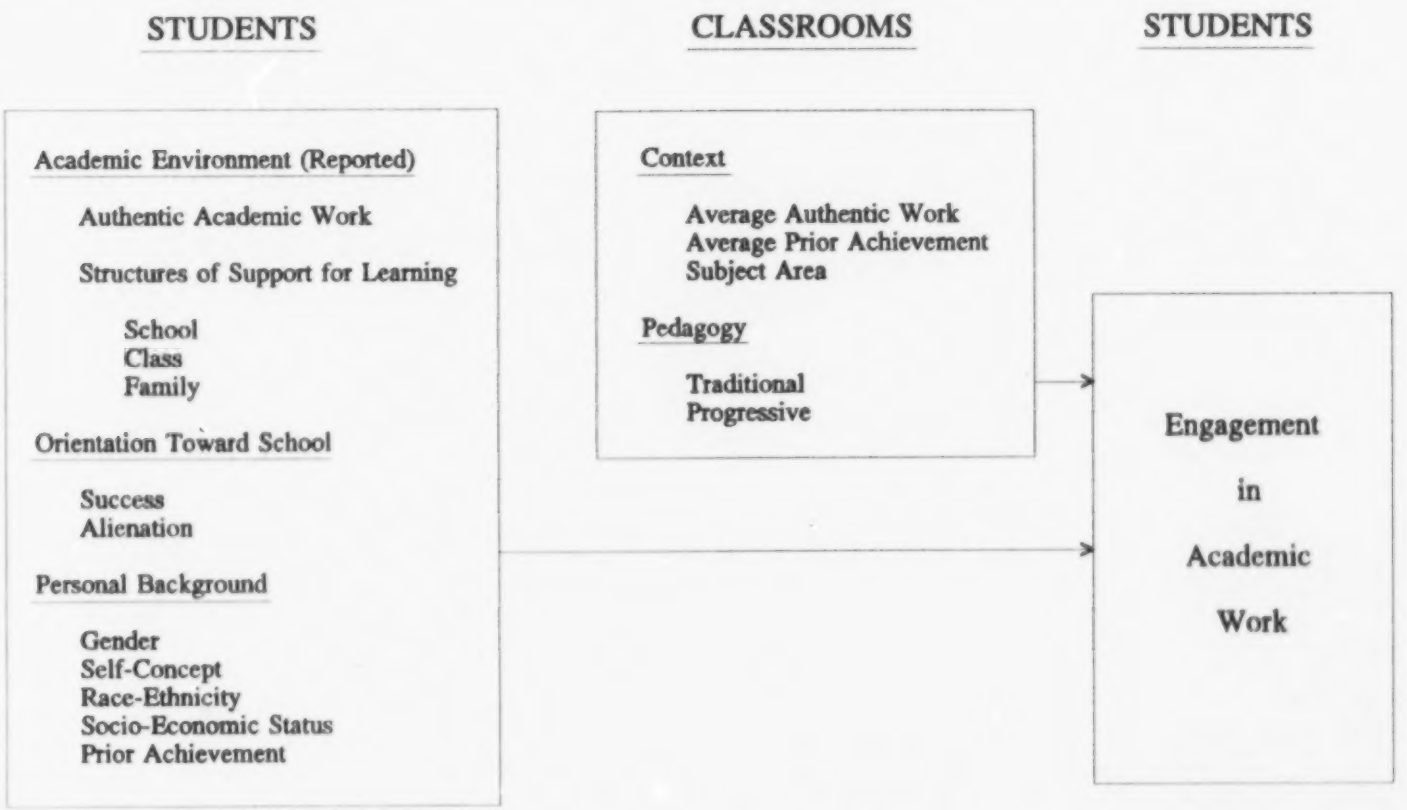
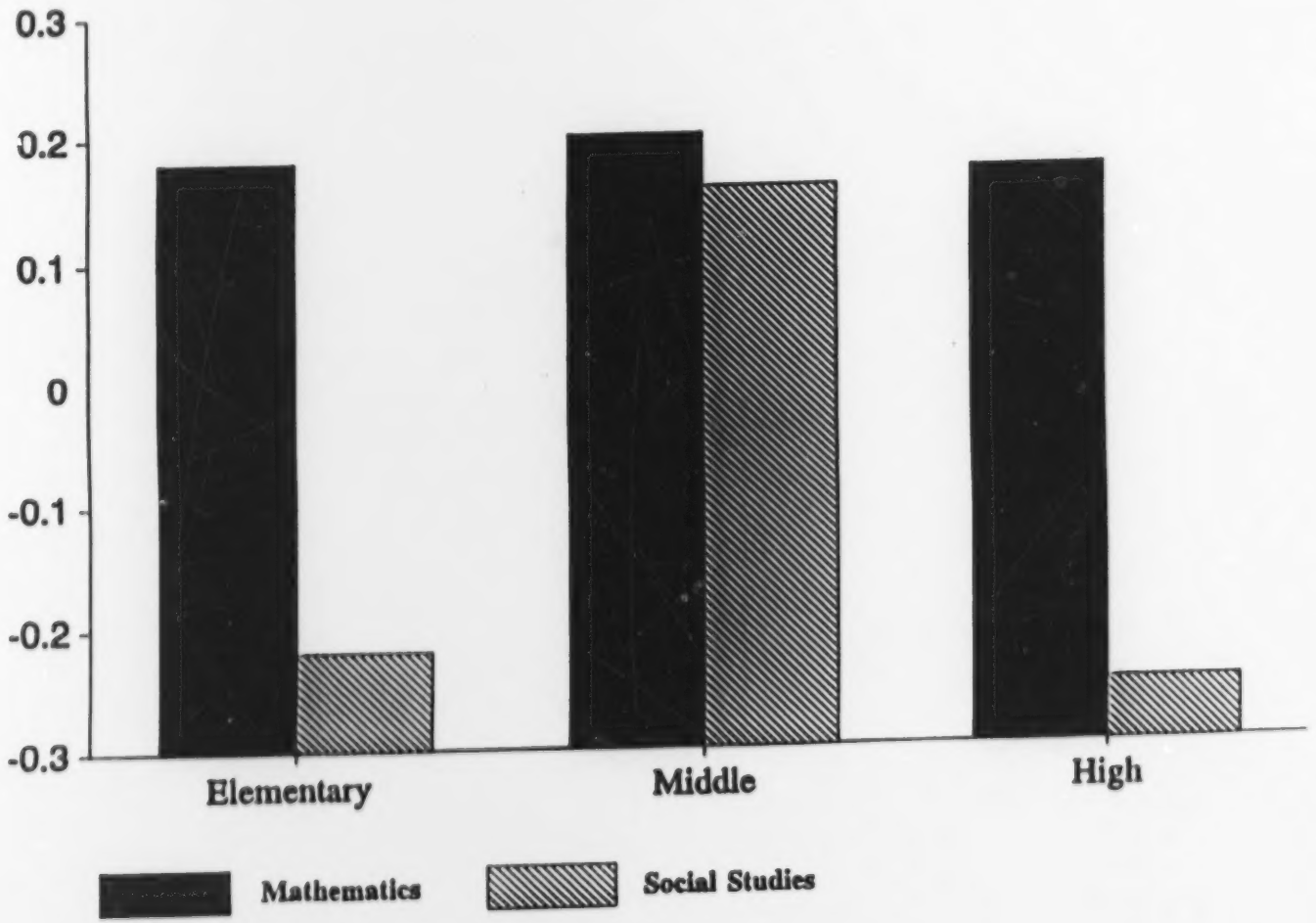


Figure 2
Student Engagement for Mathematics and Social Studies by Grade Level



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